ESA-139 Final Public Report

Introduction:

Kodak Park (KP) is the largest photographic product manufacturing facility in the world, and the largest industrial complex in the northeast United States. The KP plant site is located on more than 1,300 acres, and stretches for nearly four miles through the City of Rochester and the Town of Greece. It has some 154 major manufacturing buildings, nearly 30 miles of roads, two power plants, its own sewer system, and water treatment facilities.

The Kodak Park facility currently operates 7 coal fired boilers with capacities ranging from 160 kLb/hr to 550 kLb/hr with no. 2 and no. 6 oil as back-up fuels. Three of the larger boilers co-fire natural gas for Nox control (approximately 20% of the mmBtu input for these boilers).

Of the average electrical demand of 104 MW, approximately 100 MW is self-generated. Current (calendar year 2005) steam demand averaged 1.77 million lbs/hr.

The Kodak Park facility has been involved in continuous improvement activities centered on energy use for the past several years making significant reductions in energy use.

The Kodak Park facility has installed an Energy Information System (EIS) that monitors, trends, and displays steam flow, pressure, electrical consumption / generation, chill water temp / flow, etc for the vast majority of plant equipment and buildings. This data is available on the site intranet in a variety of display modes as well as providing for the extraction of raw data. This is certainly among the most comprehensive systems seen to date. This system is one of the main tools that is enabling the site's Steam Demand Reduction program by allowing users to see the effects of changes to plant process operations in real time.

Kodak also uses a Kaizen process as a tactical tool to help facilitate energy conservation efforts. This process, long used by Toyota and others, was successfully modified by Kodak to be applied in their Energy Reduction programs. It consists of an intense 5-day focus on an individual process to reduce energy consumption. Under the auspices of the Utility Department staff, a cross-section of supervisors, process operators, and maintenance staff examine every niche of the process to locate energy waste. With a strong bias towards immediate action, process engineers, safety leaders, and department managers are given authority to "fast-track" procedure changes to explore the energy savings effects of the projects put forth by the team. The Energy Information System allows real-time validation of energy savings providing a positive feedback to the team. Projects requiring procurement or more detailed approval are tracked with the progress toward completion and overall results communicated to the team and the facility as a whole by a "project newspaper. This process has proven to be highly successful in reducing energy consumption.

Objective of ESA:

The primary objective of the ESA was to introduce the Kodak Park Utilities staff to the US DOE Steam Tools software suite by selecting a sub-set of utility systems to model and explore for potential savings opportunities.

The Steam System Scoping Tool score for the facility (>90%) indicates a well-managed facility with little potential for improvement beyond the currently planned projects.

Focus of Assessment:

The assessment centered on the four boilers that will remain in service after the completion of the Steam Demand Reduction program. This group includes the 3 boilers that are co-fired with natural gas for Nox reduction.

Approach for ESA:

Year 2005 data for steam production and fuel use was price adjusted for the following assumptions used to determine savings throughout the ESA:

Pitt-8 Coal	$60.00 per ton
Compliance Coal	$65.00 per ton
Natural Gas	$9.50 per mmBtu
Purchased Electricity	$0.06 per kWh

The projects were modeled in SSAT for the effects on overall plant fuel use and the component fuels were then broken out using the applicable firing percentages. The "fuel mix" changes significantly in both the Demand Reduction project as well as in the Throat Modification project. SSAT was used to model the percentage fuel reduction for the Blow-down Heat Exchanger project which was applied across all the fuels.

General Observations of Potential Opportunities:

Base Year Fuel and Electrical Data

	Quantity	Units
Compliance coal	4,741,879	MM BTUs
Pitt-8 Coal	12,494,208	MM BTUs
Natural Gas	1,631,887	MM BTUs
Purchased Power	35,866,266	KWh

The client was unwilling to share actual pricing information for the base year (2005).

Project 1 - Reduce Steam Demand by Changing the Process Steam Requirements

In furtherance of consolidation of operations into a single power plant, the facility goal is to reduce steam demand to approximately 1.2 million lbs/hr. This is being accomplished, in large part, by involving the various production and manufacturing divisions in the process of optimizing process steam consumption through a Kaizen process (see Identified Best Practices). Significant reductions have already been made and the Utilities Staff indicate that they are on track to meet their goal of 1.2 million lbs/hr. The Steam System Analysis Tool (SSAT) indicates this 32% steam demand reduction represents a savings of approximately $13.1 million annually ($16 million in fuel savings and $0.5 million in water savings partially offset by an increase in purchased power expense of $3.15 million).

Project 2 - Modify boilers to reduce the cost of mixed-fuel operation for NOx suppression

This modification is designed to increase mixing and circulation at the exit of the primary combustion zone and thus reduce the natural gas required for NOx scavenging. Reduction in gas co-firing from approximately 20% to 12% in boiler no. 43 and from 18% to 10% in boiler no. 42. Total mmBtu input to the boiler remains constant – only the gas to coal ratio changes.

Total natural gas reduction for this modification, based on the reduced steam demand from Project 1, results in an annual total cost savings of approximately $5.6 million – a reduction of 43% on an annual mmBtu basis.

Project 3 - Modify Feedwater Heat Recovery using Boiler Blow-down Heat Exchanger

After the steam reduction target is achieved, the current 1% blow-down rate will be maintained. The facility currently captures the flash tank vent stream into the low pressure steam header. Addition of a heat exchanger to transfer the heat remaining in the blow-down liquid stream to boiler make-up water would result in an annual savings of approximately $79,000.

- Near term opportunities would include actions that could be taken as improvements in operating practices, maintenance of equipment or relatively low cost actions or equipment purchases.
- Medium term opportunities would require purchase of additional equipment and/or changes in the system such as addition of recuperative air pre-heaters and use of energy to substitute current practices of steam use etc. It would be necessary to carryout further engineering and return on investment analysis.
- Long term opportunities would require testing of new technology and confirmation of performance of these technologies under the plant operating conditions with economic justification to meet the corporate investment criteria.

Natural Gas Savings – as a percent of Base Year Natural Gas Cost

Near Term Opportunities	
Reduce Steam Demand	10.9%
Modify Feedwater Heat Recovery	0.1%
Medium Term Opportunities	
Boiler Throat Modification	48%
Long Term Opportunities	N/A

Management Support and Comments:

The Kodak Park Utilities Department Management and staff are enthusiastic about energy reduction. Full corporate support of their efforts is apparent. They have adopted several world-class best practices as demonstrated by a well run steam and power plant.

DOE Contact at Plant/Company:

James Breeze
1669 Lake Avenue
Rochester, NY 14652-4449
(585) 588 - 6091
james.breeze@kodak.com